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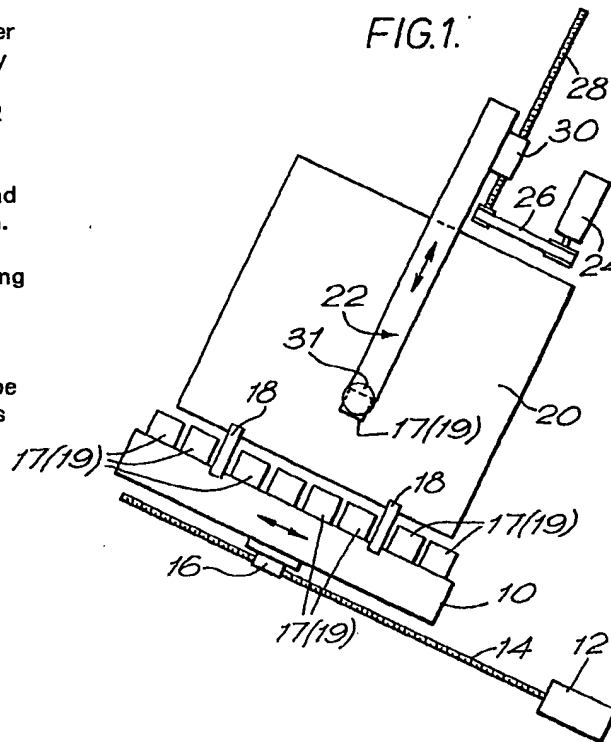
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(54) Punch press

(57) A punch press comprises a carrier 10, which is displaceable transversely of the machine and has clamps 18 to grip a workpiece 20, and a support 22 which is displaceable along an axis perpendicular to the carrier axis and supports a selected punch and die and also a ram 31 for actuating the punch. The carrier 10 mounts a number of different punches and dies 17, 19 along its length and the support can be moved to engage automatically with any of these punches and corresponding dies. The press may be arranged so that a sheet workpiece is held vertically or near vertically as shown.



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FIG. 1.

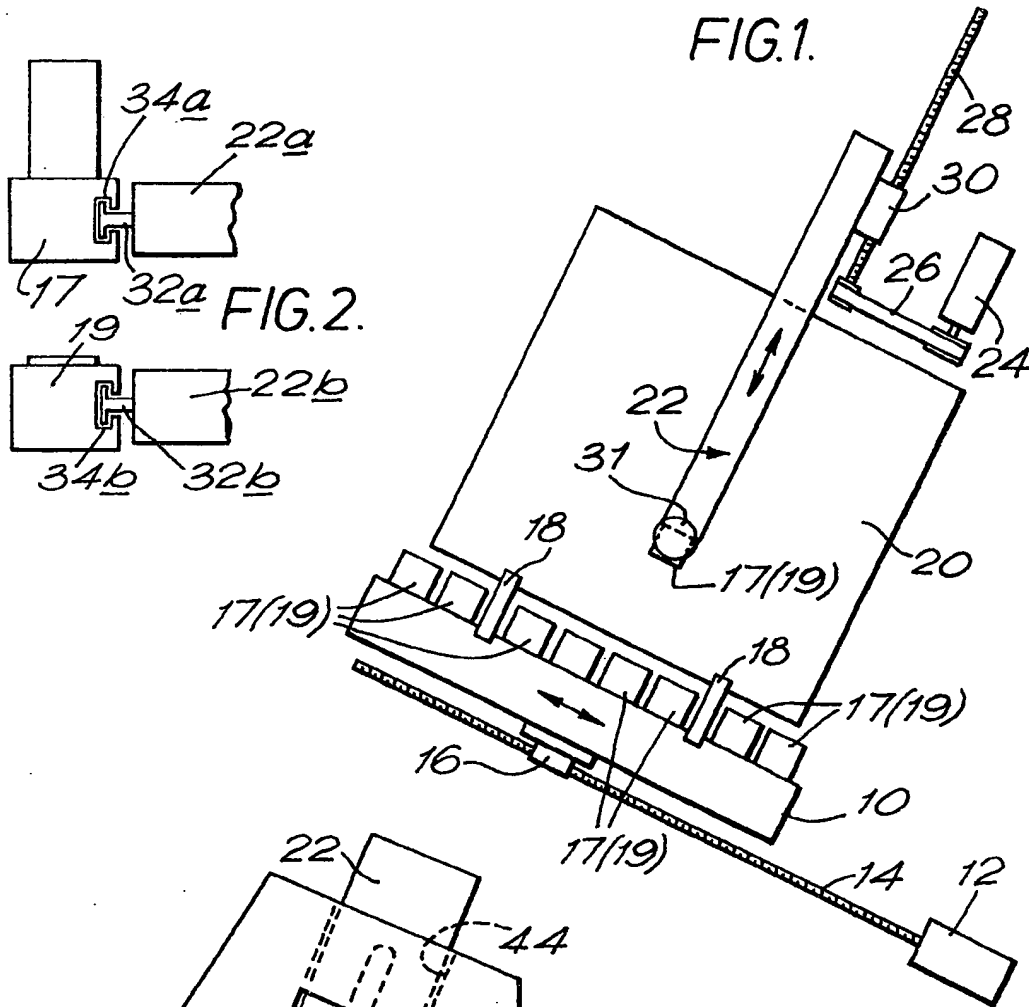


FIG. 2.

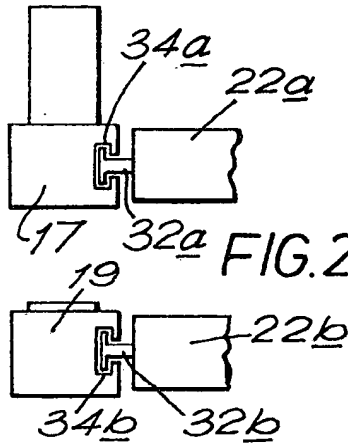
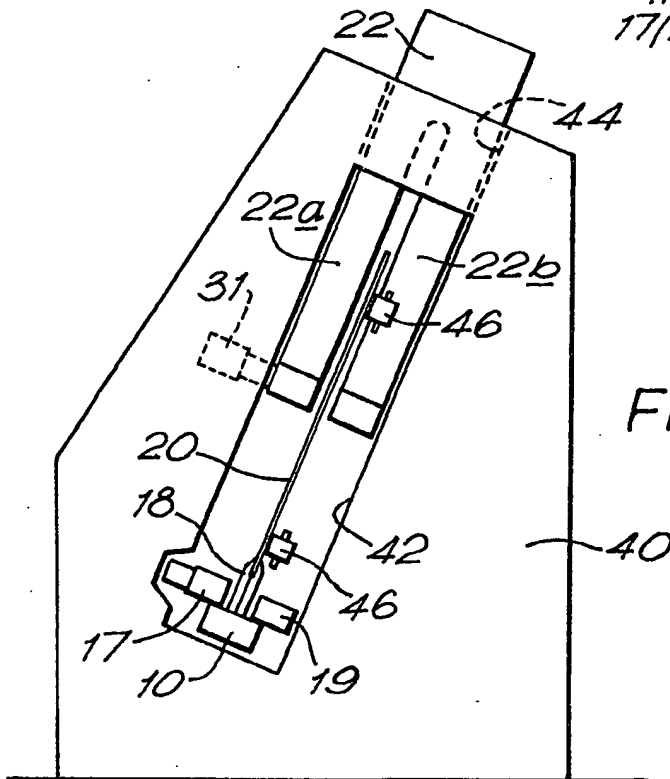


FIG. 3.



SPECIFICATION

Punch press

5 This invention relates to a punch press with improved arrangements for tool-changing.

It is known to provide arrangements in a punch press whereby tool-changes can be made (i.e. a change of both the die and its corresponding punch) in an automatic manner. These arrangements have hitherto been either complex in construction or accompanied by drawbacks in their operation.

We have now devised a punch press with improved arrangements for tool changing. Thus, in accordance with this invention, there is provided a punch press, comprising a carrier having clamps serving to grip a workpiece, the carrier further being provided with a plurality of mounts for removably receiving and storing dies and corresponding punches, and a support for the operative tools, the carrier and support being displaceable relative to each other along two mutually perpendicular axes, the support being arranged to engage to itself any selected one of the dies and its corresponding punch, and the support further carrying a ram for actuating whichever punch is engaged with the support.

Preferably the workpiece carrier is displaceable along one of said axes only relative to the machine (e.g. transversely of the machine), whilst the support is displaceable only along the other of said two axes. Starting with no die or punch engaged on the support, preferably the arrangement is such that a selected die and punch can be so-engaged by firstly displacing the carriage until the selected die and punch are adjacent the line of displacement of the support, then the support is advanced into a change-over position adjacent the carriage, then a displacement of the carriage is effected to slidably engage the selected die and punch with the support, and then a further displacement of the carriage is effected to disengage the die and punch from their mounts on the carriage. Preferably an automatic lock is provided and serves to lock the die and corresponding punch in position on the support. The reverse procedure is followed for transferring a die and its punch from the support to their mounts on the carriage.

50 In this arrangement, all tool changes are effected in a simple and rapid manner, utilising the same two drives as are present for displacing the workpiece relative to the operative tools.

In the preferred embodiment to be described herein, the arrangement is such that a sheet workpiece is held vertical or nearly-vertical plane, contrasting with known punch presses wherein the sheet workpiece is held in a horizontal plane. This arrangement of the preferred embodiment minimises the floor-area required by the machine, and also facilitates loading and unloading of the machine from and to storage racks which hold the workpieces vertically. Preferably the carrier, with its workpiece clamps and tool mounts, is disposed in the lower region of the machine, with the work-

piece projecting generally upwardly from the carrier, so that the tools are readily accessible for maintenance.

The preferred embodiment of this invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic view of the punch press to show its displaceable workpiece carrier and tool-and-ram support in plan;

Figure 2 is a diagrammatic side view of the support to show its mode of engagement with the tools; and

Figure 3 is a diagrammatic side view of the overall punch press.

Referring to *Figure 1*, the punch press comprises an elongate carrier 10 mounted for displacement transversely of the machine by means of a motor 12 driving a lead screw 14 which is engaged in a nut 16 fixed to the rear of the carrier 10. A pair of clamps 18, 18 are mounted to the front of the carrier and serve to grip a workpiece 20. Along its length, the carrier 10 is provided with a plurality of mounts, both above and below the clamps 18, 18 for respective punches 17 and their corresponding dies 19.

The punch press further comprises a support 22 which is mounted for displacement along an axis perpendicular to the axis of displacement of the carrier 10, both these axes lying within the plane of the workpiece held by the clamps 18, 18. A motor 24 transmits drive via a belt 26 to a lead screw 28 which is engaged with a nut 30 fixed to the support 22, for the purpose of displacing the support along its axis. The support 22 is divided into two limbs 22a, 22b projecting towards the carrier 10 on the opposite sides of the workpiece, and these two limbs are arranged to have engaged therewith, at their outer ends, any selected one of the punches 17 and its corresponding die 19. The support 22 further carries an actuating ram 31 serving to actuate whichever punch is engaged in position on the support.

Starting with no punch or die engaged to the support 22, firstly the carrier is displaced until the selected die and punch are adjacent the line of displacement of the support. Then the support is advanced to a change-over position adjacent the carrier, as shown in *Figure 2*. It can be seen that a displacement of the carrier will now serve to engage the punch 17 and die 19 with the support, in that "T" section projections 32a, 32b at the ends of the two limbs 22a, 22b of the support will now engage within correspondingly profiled grooves 34a, 34b in the die and punch bodies. Preferably the projections are slidably mounted to the support limbs, and a solenoid or similar drive now serves to retract the projections so as to lock the die and punch bodies firmly against the ends of the support limbs.

Preferably each die and its punch are slidably engaged with their mounts on the carrier, such that a further displacement of the carrier now serves to disengage the die and punch from the carrier. The die and its punch are now ready for

normal operation, the workpiece being moved to selected positions (relative to the die and punch) by appropriate displacements of the carrier and support, and the ram 31 being actuated at each position to actuate the punch which is engaged to the support.

Figure 3 shows the overall arrangement of the punch press. A floor-mounted main frame 40 is provided with a rectangular opening 42 which is disposed vertically or near-vertically (say 5° - 10° from vertical, although the angle of inclination is exaggerated in the drawing). The carrier 10 is mounted in the lower region of the opening 42, and is disposed transversely of the frame 40. The workpiece 20, one of its clamps 18 and one die-and-punch pair 17, 19 are shown in Figure 3. The support 22 is mounted for sliding movement through a guide opening 44 in the upper region of the main frame, so that the support 22 is displaceable lengthwise of the main machine opening 42. The opposite limbs 22a, 22b of the support slide on the opposite sides of the main opening 42: the support itself therefore does not require a high degree of rigidity, because the forces generated upon actuation of the ram 31 are transmitted through the support limbs and reacted by the main frame itself.

With the main opening 42, and therefore the workpiece 20, inclined slightly to the vertical, the workpiece can be supported in a simple manner by a set of rollers 46 along the side of the opening 42 to which the workpiece leans. The ram 31 can be mounted to either support limb 22a or 22b and the surface of the opening 42 is provided with a groove along which the ram slides as the support is displaced.

CLAIMS

1. A punch press, comprising a carrier having clamps serving to grip a workpiece, the carrier further being provided with a plurality of mounts for removably receiving and storing dies and corresponding punches, and a support for the operative tools, the carrier and support being displaceable relative to each other along two mutually perpendicular axes, the support being arranged to engage to itself any selected one of the dies and its corresponding punch, and the support further carrying a ram for actuating whichever punch is engaged with the support.

2. A punch press as claimed in claim 1, in which said carrier is displaceable along an axis transverse of the machine, and said support is displaceable along an axis perpendicular to that transverse axis.

3. A punch press as claimed in claim 2, in which a selected die and its corresponding punch are engaged with said support upon a displacement of said carrier along its axis after said support has been advanced into a changeover position adjacent the carrier.

4. A punch press as claimed in claim 3, comprising locking means operative to lock the selected die and punch in position on the support.

5. A punch press as claimed in any preceding claim, arranged such that a sheet workpiece is held vertically or at an inclined angle to the vertical.

6. A punch press as claimed in claim 5, in which the carrier, with its workpiece clamps and tool mounts, is disposed in the lower region of the machine so that in use the workpiece projects generally upwardly from the carrier.

7. A punch press, comprising a carrier having clamps serving to grip a workpiece, a support serving to support a die and a corresponding punch and a ram for actuating the punch thus-supported, and means for displacing the carrier and support relative to each other along two mutually perpendicular axes, the arrangement being such that in use a sheet workpiece is held vertically or at an inclined angle to the vertical.

8. A punch press as claimed in claim 7, in which the carrier is displaceable along an axis transverse to the machine and the support is displaceable along an axis which is vertical or at said inclined angle to the vertical.

9. A punch press substantially as herein described with reference to the accompanying drawings.